

CLAIMS

1. A hydrogel composition comprising a first portion which comprises a flexible plasticised hydrophilic polymer matrix having an internal cellular structure, and a second
5 portion which comprises a flexible plasticised hydrophilic polymer matrix having relatively continuous internal structure.
2. A hydrogel composition according to claim 1, wherein the first portion comprises a porous foam having an internal cellular structure such that the volume ratio
10 of cell void to matrix is greater than about 1:3.
3. A hydrogel composition according to claim 1 or 2, wherein the second portion has a volume ratio of cell void to matrix less than about 1:10.
- 15 4. A process for the preparation of a porous hydrogel, which comprises polymerising a polymerisable mixture comprising a hydrophilic monomer and optionally one or more comonomer, wherein the polymerisable mixture comprises a first portion including a relatively high concentration of introduced gas bubbles and a second portion including a relatively low concentration of gas bubbles.
- 20 5. A process according to claim 4, when used to prepare a hydrogel composition as defined in any one of claims 1 to 3.
6. A process according to claim 4 or claim 5, wherein the polymerisable mixture
25 is laid down in sheet or layer form on a suitable support arrangement for the polymerisation procedure, whereby the first portion of the polymerisable mixture sits on the second portion.
7. A porous hydrogel composition comprising a flexible plasticised hydrophilic
30 polymer matrix having an internal cellular structure, wherein the hydrophilic polymer is selected from polymers of any of the following monomers:

- 2-acrylamido-2-methylpropane sulphonic acid or a substituted derivative or salt thereof;
- acrylic acid (3-sulphopropyl) ester or a substituted derivative or salt thereof;
- 5 - a non-ionic monomer containing an alkyl or alkylene or substituted alkyl or alkylene group linked to a carbon-carbon double bond via an amido or alkylamido function;
- any mixture of any of the foregoing with each other or with one or more comonomer;
- a monomer/comonomer pair consisting of a first monomer comprising one or more pendant anionic group and a second monomer comprising one or more pendant cationic
- 10 group; and
- any mixture of the said monomer/comonomer pair with any of the foregoing.

8. A porous hydrogel composition according to claim 7, wherein the non-ionic monomer containing an alkyl or alkylene or substituted alkyl or alkylene group linked to

15 a carbon-carbon double bond via an amido or alkylamido function is selected from diacetone acrylamide, a vinyl lactam, an N-alkylated acrylamide, an N,N-dialkylated acrylamide, N-vinyl pyrrolidone, N-acryloyl morpholine, and any mixture thereof.

9. A porous hydrogel composition according to claim 7, wherein, in the

20 monomer/comonomer pair consisting of a first monomer comprising one or more pendant anionic group and a second monomer comprising one or more pendant cationic group, the relative amounts of the said monomers in the pair are such that the anionic groups and the cationic groups are present in essentially equimolar quantities.

25 10. A porous hydrogel composition according to claim 7, wherein the monomer is selected from 2-acrylamido-2-methylpropane sulphonic acid or a salt thereof, acrylic acid (3-sulphopropyl) ester or a salt thereof, and any mixture thereof.

11. A porous hydrogel composition according to claim 8, wherein the monomer is

30 N-acryloyl morpholine.

12. A process for the preparation of a porous hydrogel composition as defined in any one of claims 7 to 11, which comprises polymerising a polymerisable mixture comprising a hydrophilic monomer selected from said monomers and monomer mixtures, wherein the polymerisable mixture includes introduced gas bubbles.

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13. A process for the preparation of a porous hydrogel composition, comprising polymerising a polymerisable mixture comprising a hydrophilic monomer and optionally one or more comonomer, wherein the polymerisable mixture includes bubbles consisting predominantly of air, the bubbles having been introduced into the mixture under an atmosphere consisting predominantly of air, and the mixture having been laid down for the said polymerisation after introduction of the bubbles into the polymerisable mixture but before polymerisation.

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14. A process according to claim 13, when used for the preparation of a hydrogel composition according to any one of claims 1 to 3 and 7 to 11.

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15. A process according to claim 13 or 14, wherein the polymerisable mixture has a bubble to mixture volume ratio greater than about 1:3.

16. A process according to any one of claims 4 to 6 and 12 to 14, wherein the gassed (foamed) polymerisable mixture is laid down prior to polymerisation in a way which comprises casting the gassed mixture into sheet form.

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17. A bioadhesive article adapted to be adhered to skin in use, the article comprising an adhesive for contacting the skin and a substrate supporting the adhesive, wherein the adhesive comprises a bioadhesive porous plasticised hydrophilic polymer having an internal cellular structure.

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18. A bioadhesive article according to claim 17, wherein the bioadhesive polymer comprises a hydrogel composition as defined in any one of claims 1 to 3 and 7 to 11 or as prepared by a process as defined in any one of claims 4 to 6 and 12 to 16.

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19. A bioadhesive article according to claim 17 or claim 18, wherein the bioadhesive polymer is present in sheet or layer form.

20. A bioadhesive article according to any one of claims 17 to 19, wherein the bioadhesive polymer is protected by a release layer, the release layer having been applied to the bioadhesive polymer prior to the polymerisation procedure.

21. A process for preparing a bioadhesive article as defined in claim 20, wherein prior to the polymerisation the release layer defines an upper surface of a support arrangement for the polymerisable mixture, and the polymerisable mixture is laid down on said release layer.

22. A wound or burn dressing comprising an absorbent member adapted to contact a wearer's skin in the location of a wound or burn, and a sheet backing member supporting the absorbent member, the sheet backing member including a portion which extends beyond the absorbent member and defines a skin-directed surface which carries a pressure-sensitive adhesive for securement of the dressing to the wearer's skin, wherein the said absorbent member comprises a porous hydrophilic polymer having an internal cellular structure.

23. A wound or burn dressing according to claim 22, wherein the porous hydrophilic polymer comprises a hydrogel composition as defined in any one of claims 1 to 3 and 7 to 11 or as prepared by a process as defined in any one of claims 4 to 6 and 12 to 16.

24. A wound or burn dressing according to claim 22 or claim 23, wherein the sheet backing member comprises a foamed polymer, and unfoamed polymer, a woven natural fibres fabric, a non-woven natural fibres fabric, a woven synthetic fibres fabric, a non-woven synthetic fibres fabric, or any combination thereof.

25. A wound or burn dressing according to any one of claims 22 to 24, wherein the

pressure-sensitive adhesive comprises an acrylic-based polymeric pressure-sensitive adhesive; a bioadhesive non-porous hydrogel or gel; or a bioadhesive porous plasticised hydrophilic polymer having an internal cellular structure.

- 5 26. A wound or burn dressing according to claim 25, wherein the bioadhesive porous plasticised hydrophilic polymer having an internal cellular structure comprises a hydrogel composition as defined in any one of claims 1 to 3 and 7 to 11 or as prepared by a process as defined in any one of claims 4 to 6 and 12 to 16.
- 10 27. A process for the preparation of a hydrogel composition, which comprises preparing a porous hydrogel composition in sheet or layer form by polymerising a polymerisable mixture on a suitable support arrangement to obtain a porous hydrogel composition in sheet or layer form in which at least the upper face of the sheet or layer is porous, and applying to the porous upper face of the sheet or layer, while the sheet or
15 layer is on the support arrangement on which it was polymerised, a liquid composition comprising a secondary component of the hydrogel composition or a precursor thereof, followed by setting, curing or drying of the secondary component within the porous structure if desired.
- 20 28. A process according to claim 27, wherein the application of the liquid composition comprising the secondary component of the hydrogel composition or the precursor thereof takes place on the same day as the polymerisation to form the porous hydrogel material.
- 25 29. A process according to claim 27 or claim 28, wherein any subsequent desired setting, curing or drying takes place on the same day as the application of the liquid composition comprising the secondary component of the hydrogel composition or the precursor thereof.
- 30 30. A process according to any one of claims 27 to 29, when used for the preparation of a hydrogel composition according to any one of claims 1 to 3 and 7 to 11

in which at least some of the cells contain one or more secondary hydrogel component selected from electrolytes, pH regulators, colorants, chloride sources, bioactive compounds such as antimicrobials, antibiotics, antiseptics, haemostatic agents, wound healing agents, pharmaceuticals and drugs, burn healing agents, skin cooling agents, skin moisturizing agents, and skin warming agents, aroma agents, perfumes, fragrances, scents, polymers, and natural, synthetic and semi-synthetic gel materials.

31. A porous hydrogel material having an internal cellular structure and containing within at least some of the cells one or more secondary hydrogel component selected from electrolytes, pH regulators, colorants, chloride sources, bioactive compounds such as antimicrobials, antibiotics, antiseptics, haemostatic agents, wound healing agents, pharmaceuticals and drugs, burn healing agents, skin cooling agents, skin moisturizing agents, and skin warming agents, aroma agents, perfumes, fragrances, scents, polymers, and natural, synthetic and semi-synthetic gel materials.

32. A porous hydrogel material according to claim 31, wherein the internal cellular structure comprises cell walls formed of a hydrogel composition as defined in any one of claims 1 to 3 and 7 to 11 or as prepared by a process as defined in any one of claims 4 to 6, 12 to 16 and 27 to 30.

33. A water-absorbent structure comprising a porous hydrogel portion which comprises a flexible plasticised hydrophilic polymer matrix having a predominantly open-cell internal cellular structure, and a relatively non-porous further portion underlying the porous hydrogel portion, wherein the porous hydrogel portion comprises a sheet or layer of thickness less than about 0.7mm.

34. A water-absorbent structure according to claim 33, wherein the relatively non-porous further portion underlying the porous hydrogel portion comprises the same hydrogel material as the porous portion.

35. A water-absorbent structure according to claim 33, wherein the relatively non-porous further portion underlying the porous hydrogel portion comprises a different hydrogel material, a non-hydrogel material; or any combination of any of these materials.

5 36. A water-absorbent structure according to claim 33 or claim 34, wherein the flexible plasticised hydrophilic polymer matrix having a predominantly open-cell internal cellular structure comprises a hydrogel composition as defined in any one of claims 1 to 3 and 7 to 11 or as prepared by a process as defined in any one of claims 4 to 6, 12 to 16 and 27 to 30.

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37. A process for the preparation of a hydrogel structure comprising a porous hydrogel portion which comprises a flexible plasticised hydrophilic polymer matrix having a predominantly open-cell internal cellular structure, and a relatively non-porous further portion underlying the porous portion, wherein the porous hydrogel portion is in
15 the form of a sheet or layer of thickness less than about 0.7mm, the process comprising forming by admixture of the ingredients a polymerisable mixture comprising one or more monomer, a curing system for the monomer(s), at least one surfactant and at least one plasticiser, the mixture including introduced gas bubbles, and polymerizing the polymerisable mixture, wherein during the forming of the polymerisable mixture at least
20 some of the ingredients are mixed together using a rotary mixer moving at a speed of more than about 500 rpm.

38. A process according to claim 37, when used to prepare a hydrogel composition as defined in any one of claims 1 to 3 and 7 to 11 or a water-absorbent
25 structure as defined in any one of claims 33 to 36.

39. A process according to any one of claims 4 to 6, 12 to 16, 27 to 30, 37 and 38, wherein at least one further monomer or other desired component or components of the hydrogel composition or water-absorbent structure or precursor thereof is added as a
30 liquid to the polymerisable mixture after it has been laid down on a suitable support arrangement and before polymerisation, the conditions being such that the at least one

further monomer or other desired component or components or precursor percolates through an upper foam layer of the polymerisable mixture and mixes preferentially into a relatively bubble-free layer of the polymerisable mixture underlying the foam layer.